MOULDING SAND SUPPLY APPARATUS AND METHOD

TECHNICAL FIELD

The present invention relates to moulding sand supply apparatus and method for the supply of moulding sand to a flask or mould box, in accordance with the introductory part of claims 1 and 7, respectively.

BACKGROUND ART

From US-4,181,171 it is known to provide a moulding sand feeding device, in which the distribution of sand is controlled by means of guiding plates, said guiding plates guiding the falling sand to a desired distribution in a plane perpendicular to the vertical direction. In order to change the distribution of the sand, which may be necessary due to a change of mould pattern for producing another type of casting, the guiding plates will have to be changed, which involves extra downtime and work.

DISCLOSURE OF THE INVENTION

It is the object of the present invention to provide a moulding sand supply apparatus and method of the kind referred to above, with which it is possible to change the distribution of the sand in at least one direction without the necessity of changing any of the mechanical components in the apparatus, and this object is achieved with a moulding sand supply apparatus and method of said kind, which according to the present invention also comprises the features set forth in the characterizing clause of claims 1 and 7, respectively. With this arrangement, the sand distribution in the transport direction of the belt conveyor can be changed in a controlled way by simply changing the speed profile for the belt conveyor speed.

Preferred embodiments of the apparatus and method are revealed in the subordinate claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following detailed part of the present description, the invention will be explained in more detail with reference to the exemplary embodiment of a moulding sand supply apparatus according to the invention shown in the drawings, in which

Figure 1 schematically shows the sand falling from the belt conveyor down into a flask positioned to receive sand therefrom,

Figure 2 schematically shows different speed profiles for providing the varying trajectories for the delivered sand resulting in a controlled distribution of the sand in the flask,

Figure 3 schematically shows the positioning of guide plates to influence the distribution of the sand in a direction perpendicular to the transport direction of the belt conveyor,

Figure 4 schematically shows a cross section IV-IV in Fig. 3, and

Figure 5 schematically shows a cross section V-V in Fig. 1, indicating an outlet profile providing a non-uniform distribution of sand across the belt conveyor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The moulding sand supply apparatus 1 shown in Fig. 1 comprises a sand reservoir 2 from which sand 3 is delivered to a belt conveyor 4 positioned mainly horizontally below the sand reservoir 2. The belt conveyor 4 is controlled by a controller 6 in such a way that an appropriate amount of sand 3 is delivered to a flask or mould box 5 positioned to receive sand falling from the belt conveyor 4.

The controller 6 is controlling the speed v of the belt conveyor 4 in accordance with a speed profile, e.g. in accordance with Fig. 2, which provides varying trajectories for the delivered sand 3 resulting in a controlled distribution of the sand 3 in the flask 5 in the transport direction of the belt conveyor 4. As schematically indicated in Fig. 2, the sand 3 will be delivered to position A and A' close to the belt conveyor 4 as long as the belt conveyor speed is below v1 and the sand 3 will be delivered to an intermediate position B and B' when the belt conveyor speed is between v1 and v2

and finally, the sand 3 will be delivered to a position C far from the belt conveyor 4 when the belt conveyor speed is above v2. The amount of sand delivered from the belt conveyor 4 will be proportional to the belt conveyor speed v, which in Fig. 2 is indicated by the areas A, B, C, B', A' under the curve indicating the belt conveyor speed v as a function of time t.

In order to be able to control the distribution of the sand 3 in a direction perpendicular to the transport direction of the belt conveyor 3, it is suggested, as indicated in Figs. 3 and 4, to provide guide plates 7 influencing the falling sand to distribute the sand in said direction perpendicular to the transport direction of the belt conveyor 3.

Another possibility of providing a distribution control in the direction perpendicular to the transport direction of the belt conveyor 4 is schematically indicated in Fig. 5, in which the outlet from the sand reservoir 2 is provided with an outlet profile providing a profile of the sand 3 lying on the belt conveyor 4, whereby the layer thickness of the sand on the belt conveyor 4 is different at different positions across the belt conveyor 4.

This possibility may be further developed by making the outlet profile form the sand reservoir 2 movable in a vertical direction and possibly splitting the movable profile up in several individually movable parts, thus providing possibility of dynamically changing the layer thickness of the sand on the belt conveyor 4 across the belt conveyor 4 during operation.

In order to improve the control of the distribution of the sand in the flask 5, a weighing unit 9 may be provided in the form of e.g. a sensor activated by the deflection of a structure 10 supporting the flask 5. Weight signals from the weighing unit 9 can be delivered to the controller 6, whereby the control of the speed of the belt conveyor 4 can be performed in kind of a closed-loop control.

In the foregoing, the invention has been described in connection with preferred embodiments thereof and it will be evident for a man skilled in the art that many modifications may be made without departing from the concept of the invention as indicated in the following claims.